1. An antibody or antigen-binding fragment thereof that specifically binds to MGFR.

2. An antibody or antigen-binding fragment thereof as recited in claim 1, wherein the antibody or antigen-binding fragment thereof is bivalent.

3. An antibody or antigen-binding fragment thereof as recited in claim 1, wherein the antibody or antigen-binding fragment thereof is monovalent.

4. An antibody or antigen-binding fragment thereof as recited in claim 1, wherein the antibody or antigen-binding fragment thereof specifically binds to PSMGFR.

5 An antibody or antigen-binding fragment thereof as recited in claim 4, wherein the antibody or antigen-binding fragment thereof specifically binds to the amino acid sequence set forth in SEQ ID NO: 36 or a functional variant or fragment thereof comprising up to 15 amino acid additions or deletions at its N-terminus and comprising up to 20 amino acid substitutions.

6. An antibody or antigen-binding fragment thereof as recited in claim 5, wherein the antibody or antigen-binding fragment thereof specifically binds to the amino acid sequence set forth in SEQ ID NO: 36 or a functional variant or fragment thereof comprising up to 10 amino acid substitutions.

7. An antibody or antigen-binding fragment thereof as recited in claim 6, wherein the antibody or antigen-binding fragment thereof specifically binds to the amino acid sequence set forth in SEQ ID NO: 36 or a functional variant or fragment thereof comprising up to 5 amino acid substitutions.

8. An antibody or antigen-binding fragment thereof as recited in claim 7, wherein the antibody or antigen-binding fragment thereof specifically binds to the amino acid sequence set forth in SEQ ID NO: 36.

9. An antibody or antigen-binding fragment thereof as recited in claim 1, wherein the antibody or antigen-binding fragment thereof is a human, humanized, xenogeneic, or a chimeric human-non human antibody or antigen-binding fragment thereof.

10. An antibody or antigen-binding fragment thereof as recited in any one of the preceding claims, wherein the antibody or antigen-binding fragment thereof is an intact antibody.

11. An antigen-binding fragment as recited in claim 3, wherein the antigen-binding fragment comprises a single chain Fv fragment, an F ab' fragment, an F ab fragment, or an Fd fragment.

12. An antigen-binding fragment as recited in claim 2, wherein the antigen-binding fragment comprises an F $(ab')_2$ fragment.

13. A composition comprising the antibody or antigen-binding fragment thereof as recited in any one of the preceding claims.

14. An composition as recited in claim 13, which is a pharmaceutical composition and further comprises a pharmaceutically acceptable carrier.

15. An antibody or antigen-binding fragment thereof as recited in claim 1, wherein the antibody or antigen-binding fragment thereof is polyclonal.

16. An antibody or antigen-binding fragment thereof as recited in claim 1, wherein the antibody or antigen-binding fragment thereof is a monoclonal antibody.

17. A kit comprising:

the antibody or antigen-binding fragment thereof as recited in any one of claims 1-12.

18. An kit as recited in claim 17, further comprising:
an article having a surface.

19. An kit as recited in claim 18, wherein the antibody or antigen-binding fragment thereof is fastened or adapted to be fastened to the surface of the article.

20. An kit as recited in claim 19, wherein the article comprises a particle.

21. An kit as recited in claim 18, wherein the article comprises a particle.

22. An kit as recited in claim 20, further comprising:
a second particle; and
a peptide sequence comprising a portion of a cell surface receptor that remains attached to the cell surface after shedding of the cell surface receptor interchain binding region, the peptide sequence being detached from any cell, fastened to or adapted to be fastened to the second particle.

23. An kit as recited in claim 21, further comprising:
a peptide sequence comprising a portion of a cell surface receptor that remains attached to the cell surface after receptor cleavage , the peptide sequence being detached from any cell, fastened to or adapted to be fastened to the particle.

24. An kit as recited in claim 23, further comprising:
a second particle; and
the peptide sequence comprising a portion of a cell surface receptor that remains attached to the cell surface after receptor cleavage, the peptide sequence being detached from any cell, fastened to or adapted to be fastened to the second particle.

25. An kit as recited in claim 22 or 24, further comprising:

a candidate drug for affecting the ability of the peptide sequence to bind to other identical peptide sequences and/or to the antibody or antigen-binding fragment thereof in the presence of the antibody or antigen-binding fragment thereof.

26. An kit as recited in claim 25, wherein the peptide sequence comprises MGFR.

27. A method comprising:

providing a peptide including a portion of a cell surface receptor that interacts with an activating ligand such as a growth factor to promote cell proliferation, the portion including enough of the cell surface receptor to interact with the activating ligand and the portion; and

generating a antibody or antigen-binding fragment thereof that specifically binds to the peptide.

28. An method as recited in claim 27, wherein the antibody or antigen-binding fragment thereof is bivalent.

29. An method as recited in claim 27, wherein the antibody or antigen-binding fragment thereof is monovalent.

30. An antibody or antigen-binding fragment thereof produced according to the method described in claim 27.

31. An antibody or antigen-binding fragment thereof as recited in claim 30, wherein the antibody or antigen-binding fragment thereof is an intact antibody.

32. A method as recited in claim 27, wherein the cell surface receptor comprises MUC1.

33. A method as recited in claim 32, wherein the peptide comprises MGFR.

34. A method as recited in claim 27, wherein the peptide consists of the amino acid sequence set forth in SEQ ID NO: 36.

35. A method as recited in claim 27, wherein the peptide comprises the amino acid sequence set forth in SEQ ID NO: 7.

36. A method for treating a subject having a cancer characterized by the aberrant expression of MUC1, comprising,

administering to the subject an antibody or antigen-binding fragment thereof in an amount effective to ameliorate the cancer.

37. A method as recited in claim 36, wherein the antibody or antigen-binding fragment thereof is monovalent.

38. A method as recited in claim 37, wherein the antibody or antigen-binding fragment thereof is an intact single-chain antibody.

39. A method as recited in claim 36, wherein in the administering step, the antibody or antigen-binding fragment thereof is administered in an amount effective to reduce tumor growth.

40. A method as recited in claim 36, wherein the antibody or antigen-binding fragment thereof specifically binds to MGFR.

41. A method as in claim 37, wherein the method comprises administering to the subject the antibody or antigen-binding fragment thereof in an amount effective to block the interaction of a natural ligand and a portion of a MUC1 receptor that remains attached to a cell surface after cleavage of the MUC1 receptor.

42. A method as recited in claim 36, comprising administering to the subject the antibody or antigen-binding fragment thereof in an amount effective to reduce shedding of an interchain binding region of a MUC1 receptor.

43. A method as recited in claim 36, wherein the cancer comprises at least one of breast, prostate, lung, ovarian, colorectal, pancreatic and brain cancer.

44. A method as recited in treating a subject having cancer or at risk for developing cancer comprising:

administering to the subject an antibody or antigen-binding fragment thereof that specifically binds to a peptide including a portion of a cell surface receptor that interacts with an activating ligand such as a growth factor to promote cell proliferation, the portion including enough of the cell surface receptor to interact with the activating ligand.

45. A method as recited in claim 44, wherein the antibody or antigen-binding fragment thereof is monovalent.

46. A method as recited in claim 45, wherein the antibody or antigen-binding fragment thereof is an intact single-chain antibody.

47. A method as recited in claim 44, wherein the cell surface receptor is MUC1.

48. A method as recited in claim 47, wherein the peptide comprises MGFR.

49. A method as recited in claim 48, wherein the peptide comprises PSMGFR at its N-terminus.

50. A method as recited in claim 48, wherein the peptide comprises at its N-terminus the amino acid sequence set forth in SEQ ID NO: 36 or a functional variant or fragment thereof comprising up to 15 amino acid additions or deletions at its N-terminus and comprising up to 20 amino acid substitutions.

51. A method as recited in claim 49, wherein the peptide consists of PSMGFR.

52. A method as recited in claim 51, wherein the peptide consists of the amino acid sequence set forth in SEQ ID NO: 36 or a functional variant or fragment thereof comprising

up to 15 amino acid additions or deletions at its N-terminus and comprising up to 20 amino acid substitutions.

53. A method as recited in claim 52, wherein the peptide consists of the amino acid sequence set forth in SEQ ID NO: 36.

54. A method as recited in claim 52, wherein the antibody or antigen-binding fragment thereof that specifically binds to the amino acid sequence set forth in SEQ ID NO: 7.

55. A method as recited in claim 44, wherein the cancer comprises at least one of breast, prostate, lung, ovarian, colorectal, pancreatic and brain cancer.

56. A method as recited in claim 47, wherein the cancer is characterized by the aberrant expression of MUC1.

57. A method determining the aggressiveness and/or metastatic potential of a cancer comprising:

contacting a sample obtained from a subject having or suspected of having the cancer with an antibody or antigen-binding fragment thereof that specifically binds to a peptide expressed on a cell surface; and

determining an amount of the antibody or antigen-binding fragment thereof that specifically binds to the sample.

58. A method as recited in claim 57, wherein the sample comprises cells of the subject and/or a solubilized lysate thereof.

59. A method as recited in claim 57, wherein the peptide includes a portion of a cell surface receptor that interacts with an activating ligand such as a growth factor to promote cell proliferation, the portion including enough of the cell surface receptor to interact with the activating ligand.

60. A method as recited in claim 57, wherein the antibody or antigen-binding fragment thereof is immobilized relative to or adapted to be immobilized relative to a signaling entity.

61. A method as recited in claim 60, wherein the antibody or antigen-binding fragment thereof is bivalent.

62. A method as recited in claim 59, wherein the cell surface receptor is MUC1.

63. A method as recited in claim 52, wherein the peptide comprises MGFR.

64. A method as recited in claim 53, wherein the peptide comprises PSMGFR at its N-terminus.

65. A method as recited in claim 57, wherein the cancer comprises at least one of breast, prostate, lung, ovarian, colorectal, pancreatic and brain cancer.

66. A method as recited in claim 62, wherein the cancer is characterized by the aberrant expression of MUC1.

67. An isolated nucleic acid molecule that encodes PSMGFRTC, and degenerates, complements, and unique fragments thereof.

68. An isolated nucleic acid molecule that encodes the amino acid sequence set forth in SEQ ID NO: 37, and degenerates, complements, and unique fragments thereof.

69. An expression vector comprising the isolated nucleic acid molecule as recited in claim 67 or 68 operably linked to a promoter.

70. A host cell transfected or transformed with an expression vector comprising the nucleic acid molecule as recited in claim 67 or 68.

71. An isolated nucleic acid molecule that hybridizes to the nucleic acid sequence set forth in SEQ ID NO: 42 under high stringency conditions, and degenerates, complements, and unique fragments thereof.

72. An expression vector comprising the isolated nucleic acid molecule as recited in claim 66 or degenerate or complement thereof operably linked to a promoter.

73. A host cell transfected or transformed with an expression vector comprising the nucleic acid molecule as recited in claim 66 or a degenerate or complement thereof.

74. A method comprising:

transfecting or transforming a host cell with an expression vector encoding an amino acid sequence comprising a cell surface peptide including a portion of a cell surface receptor, the portion including enough of the cell surface receptor both to interact with an activating ligand such as a growth factor and to promote cell proliferation and being free of an interchain binding region of the cell surface receptor to the extent necessary to prevent spontaneous binding between portions;

facilitating expression of the peptide by the cell so that the cell presents the peptide on its surface.

75. A method as in claim 74, wherein the cell surface receptor comprises MUC1.

76. A method as in claim 75, wherein the cell surface peptide comprises MGFR.

77. A method as in claim 76, wherein the cell surface peptide comprises PSMGFR at its N-terminus.

78. A method as recited in claim 75, further comprising:

contacting the cell presenting the peptide on its surface with a candidate drug for affecting the ability of the activating ligand to interact with the peptide, and to the activating ligand; and

determining the ability of the candidate drug to prevent interaction of the activating ligand with the peptide.

79. A method as recited in claim 78, comprising contacting a plurality of cells presenting the peptide on their surface with a candidate drug for affecting the ability of the activating ligand to interact with the peptide, and to the activating ligand in the contacting step.

80. A method as recited in claim 79, comprising determining a cell proliferation rate and/or viability of the cells in the determining step.

81. A method as recited in claim 78, comprising determining whether an intracellular protein that becomes phosphorylated upon interaction of the activating ligand with the peptide is phosphorylated.

82. A method as recited in claim 81, wherein the intracellular protein is ERK-2.

83. A method as recited in 78, wherein at least one of the activating ligand and the candidate drug is immobilized relative to an auxiliary signaling entity.

84. A method as recited in claim 83, wherein the auxiliary signaling entity is a colloid particle.

85. A method as recited in claim 83, wherein the auxiliary signaling entity is not a colloid particle.

86. A method as recited in claim 83, wherein at least one of the activating ligand and the candidate drug is immobilized relative to an auxiliary signaling entity that is attached to a colloid particle.

87. A method as recited in claim 75, wherein the activating ligand is bivalent and is capable of specifically binding to two of the cell surface peptides.

88. A method as recited in claim 87, wherein the activating ligand comprises an antibody or antigen-binding fragment thereof that specifically binds to MGFR.

89. A method comprising:

providing a peptide including a portion of a cell surface receptor, the portion including enough of the cell surface receptor both to interact with an activating ligand such as a growth factor and to promote cell proliferation and being free of an interchain binding region of the cell surface receptor to the extent necessary to prevent spontaneous binding between portions; and

developing an expression vector comprising a nucleic acid molecule that encodes the peptide.

90. An expression vector produced by the method described in claim 89.

91. A method as in claim 89, wherein the cell surface receptor comprises MUC1.

92. A method as in claim 91, wherein the peptide comprises MGFR.

93. A method as in claim 92, wherein the peptide comprises PSMGFR at its N-terminus.

94. A method comprising:

providing a cell expressing on its surface a peptide including a portion of a cell surface receptor, the portion including enough of the cell surface receptor both to interact with an activating ligand such as a growth factor and to promote cell proliferation and being free of an interchain binding region of the cell surface receptor to the extent necessary to prevent spontaneous binding between portions;

contacting the cell with a candidate drug for affecting the ability of the activating ligand to interact with the peptide, and to the activating ligand; and

determining whether an intracellular protein that becomes phosphorylated upon interaction of the activating ligand with the peptide is phosphorylated.

95. A method as recited in claim 94, wherein the cell surface receptor is MUC1.

96. A method as recited in claim 95, wherein the cell is a MUC1 positive tumor cell.

97. A method as recited in claim 95, wherein the peptide comprises MGFR.

98. A method as recited in claim 97, wherein the peptide comprises PSMGFR at its N-terminus.

99. A method as recited in claim 94, wherein the intracellular protein comprises ERK-2.

100. A method as recited in claim 94, comprising contacting a plurality of cells presenting the peptide on their surfaces with a candidate drug for affecting the ability of the activating ligand to interact with the peptide, and to the activating ligand in the contacting step.

101. A method as recited in claim 100, further comprising after the contacting step:
lysing or permeablizing the cells.

102. A method as recited in claim 101, further comprising:
separating proteins contained in intracellular contents obtained in the lysing or permeablizing step based on their molecular size using a gel.

103. A method as recited in claim 102, comprising contacting proteins separated in the separating step with a biological molecule that specifically binds to a phosphorylated form of the intracellular protein but not to the intracellular protein when it is not phosphorylated.

104. A method as recited in claim 103, wherein the biological molecule is an antibody or antigen-binding fragment thereof.

105. A method as recited in claim 104, wherein the antibody or antigen-binding fragment thereof is immobilized relative to at least one auxiliary signaling entity.

106. A method as recited in claim 105, wherein the auxiliary signaling entity comprises a colloid particle.

107. A method as recited in claim 105, wherein the auxiliary signaling entity comprises at least one of a dye, pigment, electroactive molecule, chemiluminescent moiety, electrochemiluminescent moiety, fluorescent moiety, up-regulating phosphor, and enzyme-linked signaling moiety including horse radish peroxidase and alkaline phosphatase.

108. A method as recited in claim 103, further comprising:

contacting proteins separated in the separating step with a first biological molecule that specifically binds to a phosphorylated form of the intracellular protein but not to the intracellular protein when it is not phosphorylated and to a second biological molecule that specifically binds to the first biological molecule.

109. A method as in claim 108, wherein the second biological molecule is an antibody or antigen binding fragment thereof.

110. A method as recited in claim 109, wherein the antibody or antigen-binding fragment thereof is immobilized relative to at least one auxiliary signaling entity.

111. A method as recited in claim 110, wherein the auxiliary signaling entity comprises a colloid particle.

112. A method as recited in claim 110, wherein the auxiliary signaling entity comprises at least one of a dye, pigment, electroactive molecule, chemiluminescent moiety, electrochemiluminescent moiety, fluorescent moiety, up-regulating phosphor, and enzyme-linked signaling moiety including horse radish peroxidase and alkaline phosphatase.

113. A method as recited in claim 101, further comprising contacting proteins contained in intracellular contents obtained in the lysing or permeablizing step with a plurality of colloid particles.

114. A method as recited in claim 113, wherein a first subset of the colloid particles is immobilized relative to a first biological molecule that specifically binds to a phosphorylated form of the intracellular protein but not to the intracellular protein when it is not phosphorylated, and a second subset of the colloid particles is immobilized relative to a second biological molecule that specifically binds to the phosphorylated form of the intracellular protein at an epitope thereof that is different from an epitope at which the first biological molecule specifically binds.

115. A method as recited in claim 114, wherein the determining step comprises detecting whether or not a color change occurs, a color change being indicative of aggregation of the colloid particles indicating the presence of the phosphorylated form of the intracellular protein.

116. A method as recited in claim 114, wherein the first biological molecule is an antibody or antigen-binding fragment thereof, and the second biological molecule is an antibody or antigen-binding fragment thereof that binds to both the phosphorylated form of the intracellular protein and to the intracellular protein when it is not phosphorylated.

117. A method as recited in claim 116, wherein the intracellular protein is ERK-2.

118. A method comprising:

providing a cell expressing on its surface a peptide comprising MGFR;

contacting the cell with a candidate drug for affecting the ability of an activating ligand to interact with MGFR, and to the activating ligand; and

determining whether an ERK-2 protein within the cell is phosphorylated.

119. A method as recited in claim 118, wherein the cell is a MUC1 positive tumor cell.

120. A method as recited in claim 118, wherein the peptide comprises PSMGFR at its N-terminus.

121. A method as recited in claim 118, comprising contacting a plurality of cells presenting the peptide on their surface with a candidate drug for affecting the ability of the activating ligand to interact with MGFR, and to the activating ligand in the contacting step.

122. A method as recited in claim 121, further comprising after the contacting step: lysing or permeablizing the cells.

123. A method as recited in claim 122, further comprising:
separating proteins contained in intracellular contents obtained in the lysing or permeablizing step based on their molecular size using a gel.

124. A method as recited in claim 123, comprising contacting proteins separated in the separating step with a biological molecule that specifically binds to a phosphorylated form of ERK-2 but not to ERK-2 when it is not phosphorylated.

125. A method as recited in claim 124, wherein the biological molecule is an antibody or antigen-binding fragment thereof.

126. A method as recited in claim 125, wherein the antibody or antigen-binding fragment thereof is immobilized relative to at least one auxiliary signaling entity.

127. A method as recited in claim 126, wherein the auxiliary signaling entity comprises a colloid particle.

128. A method as recited in claim 126, wherein the auxiliary signaling entity comprises at least one of a dye, pigment, electroactive molecule, chemiluminescent moiety, electrochemiluminescent moiety, fluorescent moiety, up-regulating phosphor, and enzyme-linked signaling moiety including horse radish peroxidase and alkaline phosphatase.

129. A method as recited in claim 123, further comprising:

contacting proteins separated in the separating step with a first biological molecule that specifically binds to a phosphorylated form of the intracellular protein but not to the intracellular protein when it is not phosphorylated and to a second biological molecule that specifically binds to the first biological molecule.

130. A method as in claim 129, wherein the second biological molecule is an antibody or antigen binding fragment thereof.

131. A method as recited in claim 130, wherein the antibody or antigen-binding fragment thereof is immobilized relative to at least one auxiliary signaling entity.

132. A method as recited in claim 131, wherein the auxiliary signaling entity comprises a colloid particle.

133. A method as recited in claim 131, wherein the auxiliary signaling entity comprises at least one of a dye, pigment, electroactive molecule, chemiluminescent moiety, electrochemiluminescent moiety, fluorescent moiety, up-regulating phosphor, and enzyme-linked signaling moiety including horse radish peroxidase and alkaline phosphatase.

134. A method as recited in claim 122, further comprising contacting proteins contained in intracellular contents obtained in the lysing or permeablizing step with a plurality of colloid particles.

135. A method as recited in claim 134, wherein a first subset of the colloid particles is immobilized relative to a first biological molecule that specifically binds to a phosphorylated form of ERK-2 but not to ERK-2 when it is not phosphorylated, and a second subset of the colloid particles is immobilized relative to a second biological molecule that specifically binds to the phosphorylated form of ERK-2 at an epitope thereof that is different from an epitope at which the first biological molecule specifically binds.

136. A method as recited in claim 135, wherein the determining step comprises detecting whether or not a color change occurs, a color change being indicative of aggregation of the colloid particles indicating the presence of the phosphorylated form of ERK-2.

137. A method as recited in claim 135, wherein the first biological molecule is an antibody or antigen-binding fragment thereof, and the second biological molecule is an antibody or antigen-binding fragment thereof that binds to both the phosphorylated form of ERK-2 to the ERK-2 when it is not phosphorylated.

138. A method comprising:

simultaneously determining whether a drug candidate suspected of having the ability to interfere with the binding of an activating ligand to a cell surface receptor interferes with the binding of the activating ligand to the cell surface receptor and whether the drug candidate interacts with the cell surface receptor or the ligand.

139. A method for determining the modification state of a biological molecule, comprising:

providing a colloid particle, which is configured to become immobilized with respect to the biological molecule when the biological molecule is in a first modification state to a different extent than when the biological molecule is in a second modification state, in proximity with the biological molecule; and

detecting immobilization of the colloid particle relative to the biological molecule.

140. A method as in claim 139, wherein the biological molecule is a protein.

141. A method as in claim 140, wherein the biological molecule is ERK-2.

142. A method as in claim 139, wherein the second modification state comprises an unmodified state.

143. A method as in claim 139, wherein in the first modification state, the biological molecule is at least one of phosphorylated, glycosylated, or acetylated.

144. A method as in claim 139, wherein the biological molecule is in a gel or on a membrane during at least one of the providing and determining steps.

145. A method as recited in claim 139, comprising contacting a plurality of the biological molecules to an agent that specifically binds to the biological molecule when it is in the first state of modification but not to the biological molecule when it is in the second state of modification.

146. A method as recited in claim 145, wherein the agent is an antibody or antigen-binding fragment thereof.

147. A method as recited in claim 146, wherein the antibody or antigen-binding fragment thereof is immobilized relative to at least one auxiliary signaling entity.

148. A method as recited in claim 147, wherein the auxiliary signaling entity comprises the colloid particle.

149. A method as recited in claim 148, wherein the auxiliary signaling entity further comprises at least one of a dye, pigment, electroactive molecule, chemiluminescent moiety, electrochemiluminescent moiety, fluorescent moiety, up-regulating phosphor, and enzyme-linked signaling moiety including horse radish peroxidase and alkaline phosphatase.

150. A method as recited in claim 145, further comprising:

contacting the plurality of biological molecules with a first agent that specifically binds to the biological molecule when it is in the first state of modification but not to the biological molecule when it is in the second state of modification, and to a second agent that specifically binds to the first agent.

151. A method as in claim 150, wherein the second agent is an antibody or antigen binding fragment thereof.

152. A method as recited in claim 151, wherein the antibody or antigen-binding fragment thereof is immobilized relative to at least one auxiliary signaling entity.

153. A method as recited in claim 152, wherein the auxiliary signaling entity comprises the colloid particle.

154. A method as recited in claim 153, wherein the auxiliary signaling entity further comprises at least one of a dye, pigment, electroactive molecule, chemiluminescent moiety, electrochemiluminescent moiety, fluorescent moiety, up-regulating phosphor, and enzyme-linked signaling moiety including horse radish peroxidase and alkaline phosphatase.

155. A method as recited in claim 139, further comprising contacting a plurality of the biological molecules to a plurality of colloid particles.

156. A method as recited in claim 155, wherein a first subset of the colloid particles is immobilized relative to a first agent that specifically binds to the biological molecule when it is in the first state of modification but not to the biological molecule when it is in the second state of modification, and a second subset of the colloid particles is immobilized relative to a second agent that specifically binds to the biological molecule when it is in the first state of modification at an epitope thereof that is different from an epitope at which the first agent specifically binds.

157. A method as recited in claim 156, wherein the detecting step comprises detecting whether or not a color change occurs, a color change being indicative of aggregation of the colloid particles indicating the presence of the biological molecule when it is in the first state of modification.

158. A method as recited in claim 156, wherein the first agent is an antibody or antigen-binding fragment thereof, and the second agent is an antibody or antigen-binding fragment thereof that binds to biological molecule both when it is in the first state of modification and when it is in the second state of modification.

159. A method as in claim 139, further comprising:

determining which of a plurality of intracellular signaling pathways is activated upon binding of an activating ligand to a cell surface receptor from information obtained in the detecting step.

160. An isolated protein or peptide comprising PSMGFR at its N-terminus, wherein the isolated protein or peptide does not comprise any of the amino acid sequences set forth in SEQ ID NOs: 1, 2, 3, 6, or 7.

161. An isolated protein or peptide as recited in claim 160 comprising at its N-terminus the amino acid sequence set forth in SEQ ID NO: 36, or a functional variant or fragment thereof comprising up to 15 amino acid additions or deletions at its N-terminus and comprising up to 20 amino acid substitutions.

162. An isolated protein or peptide as recited in claim 160 comprising at its N-terminus the amino acid sequence set forth in SEQ ID NO: 36 or SEQ ID NO: 63, or a functional variant or fragment thereof comprising up to 10 amino acid substitutions.

163. An isolated protein or peptide as recited in claim 162 comprising at its N-terminus the amino acid sequence set forth in SEQ ID NO: 36 or SEQ ID NO: 63, or a functional variant or fragment thereof comprising up to 5 amino acid substitutions.

164. An isolated protein or peptide as recited in claim 163 comprising the amino acid sequence set forth in SEQ ID NO: 36 at its N-terminus.

165. An isolated protein or peptide as recited in claim 163 comprising the amino acid sequence set forth in SEQ ID NO: 63 at its N-terminus.

166. An isolated protein or peptide as recited in claim 160 consisting of the amino acid sequence set forth in SEQ ID NO: 36 or a functional variant or fragment thereof comprising up to 15 amino acid additions or deletions at its N-terminus and comprising up to 20 amino acid substitutions.

167. An isolated protein or peptide as recited in claim 166 consisting of the amino acid sequence set forth in SEQ ID NO: 36 or SEQ ID NO: 63, or a functional variant or fragment thereof comprising up to 10 amino acid substitutions.

168. An isolated protein or peptide as recited in claim 167 consisting of the amino acid sequence set forth in SEQ ID NO: 36 or SEQ ID NO: 63, or a functional variant or fragment thereof comprising up to 5 amino acid substitutions.

169. An isolated protein or peptide as recited in claim 168 consisting of the amino acid sequence set forth in SEQ ID NO: 36.

170. An isolated protein or peptide as recited in claim 168 consisting of the amino acid sequence set forth in SEQ ID NO: 63.

171. An isolated protein or peptide comprising the amino acid sequence set forth in SEQ ID NO: 7 at its N-terminus.

172. An isolated protein or peptide as recited in claim 171 consisting of the amino acid sequence set forth in SEQ ID NO: 7.

173. An isolated protein or peptide comprising the amino acid sequence set forth in SEQ ID NO: 64 at its N-terminus.

174. An isolated protein or peptide as recited in claim 173 consisting of the amino acid sequence set forth in SEQ ID NO: 64.

175. An isolated protein or peptide comprising His-PSMGFR, wherein the isolated protein or peptide does not comprise any of the amino acid sequences set forth in SEQ ID NOs: 1, 2, or 3.

176. An isolated protein or peptide as recited in claim 175, wherein the PSMGFR is at the N-terminus of the protein or peptide and polyhistidine is at the C-terminus of the protein or peptide.

177. An isolated protein or peptide comprising the amino acid sequence set forth in SEQ ID NO: 2.

178. An isolated protein or peptide comprising the amino acid sequence set forth in SEQ ID NO: 60.

179. An isolated protein or peptide as recited in claim 177 consisting of the amino acid sequence set forth in SEQ ID NO: 2.

180. An isolated protein or peptide as recited in claim 178 consisting of the amino acid sequence set forth in SEQ ID NO: 60.

181. An isolated protein or peptide comprising the amino acid sequence set forth in SEQ ID NO: 7.

182. An isolated protein or peptide as recited in claim 181 consisting of the amino acid sequence set forth in SEQ ID NO: 7.

183. An isolated protein or peptide comprising the amino acid sequence set forth in SEQ ID NO: 64.

184. An isolated protein or peptide as recited in claim 183 consisting of the amino acid sequence set forth in SEQ ID NO: 64.

185. An antibody or antigen-binding fragment thereofthat specifically binds to the amino acid sequence set forth in SEQ ID NO: 8.

186. An antibody or antigen-binding fragment thereof that specifically binds to the amino acid sequence set forth in SEQ ID NO: 65.

187. An antibody or antigen-binding fragment thereof that specifically binds to the unique region of the sequence set forth in SEQ ID NO: 39.

188. An antibody or antigen-binding fragment thereof that specifically binds to a region spanning the N-terminus and amino acid number 104 of the amino acid sequence set forth in SEQ ID NO: 39.

189. A method comprising acts of:

applying an antibody or antigen-binding fragment thereof as recited in any one of claims 1-16, and 185-188 to a sample;

observing an interaction of the antigen-binding fragment thereof with the sample; and

making a diagnosis of the presence or absence of cancer or the agressiveness of a cancer based at least in part on information observed in the observing act.

190. A method as recited in claim 189, comprising:

contacting a sample comprising a tissue specimen, bodily fluid, or cells derived from a patient; and

measuring an amount of MUC1 receptor or portion thereof that is present in the sample.

191. A method as recited in claim 189, comprising:

contacting a tissue specimen, bodily fluid, or cells derived from a patient; and

determining a loss of clustering pattern of MUC1 receptors or portions thereof.

192. A method as recited in claim 189, comprising:

contacting a sample comprising a tissue specimen, bodily fluid, or cells derived from a patient; and

measuring an amount of PSMGFR that is present in the sample.

193. A method as recited in claim 189, comprising:

contacting a sample comprising a tissue specimen, bodily fluid, or cells derived from a patient; and

measuring an amount of PSIBR that is present in the sample.

194. A method as recited in claim 189, comprising:

contacting a sample comprising a tissue specimen, bodily fluid, or cells derived from a patient; and

measuring an amount of TPSIBR that is present in the sample.

195. A method as recited in any one of claims 189-194, further comprising:

designing a cancer treatment protocol based at least in part on information observed in the observing act.